Abstract submitted to Fifth Annual Conference on Carbon Capture and Sequestration
Topic: Sequestration of Carbon Emissions in Geologic Formations
Sub-topic: Saline Reservoirs

Strategies for Optimization of Pore Volume Utilization for CO_2 Storage Projects in Saline Formations

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Making the most efficient use of the underground pore space is one strategy for maximizing the safety and effectiveness of storage in saline formations. By using a large fraction of the available pore volume, the spatial dimensions of the CO_2 plume can be kept to a minimum – thereby limiting the number of abandoned wells potentially encountered by the plume, decreasing the footprint over which monitoring is required and increasing the capacity of a storage formation. Today, estimates of the pore volume available for storage range from as low as 1-2% of the formation, to as high as 20-30%. The lower estimates do not arise from an intrinsic lack of pore space, but reflect the difficulty of accessing certain parts of the formation. The purpose of this paper is to explore strategies for increasing the fraction of the pore space that is accessed by CO_2 and is available for storage. A new version of the numerical simulator TOUGH2, which includes hysteretic formulations for the relative permeability and capillary pressure functions, is used to carry out simulations aimed at identifying injection strategies to increase pore volume availability. Injection strategies include intermittent injection during the early stages of the project, optimizing locations of multiple injection wells, and using different well completion intervals within the storage horizon.

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